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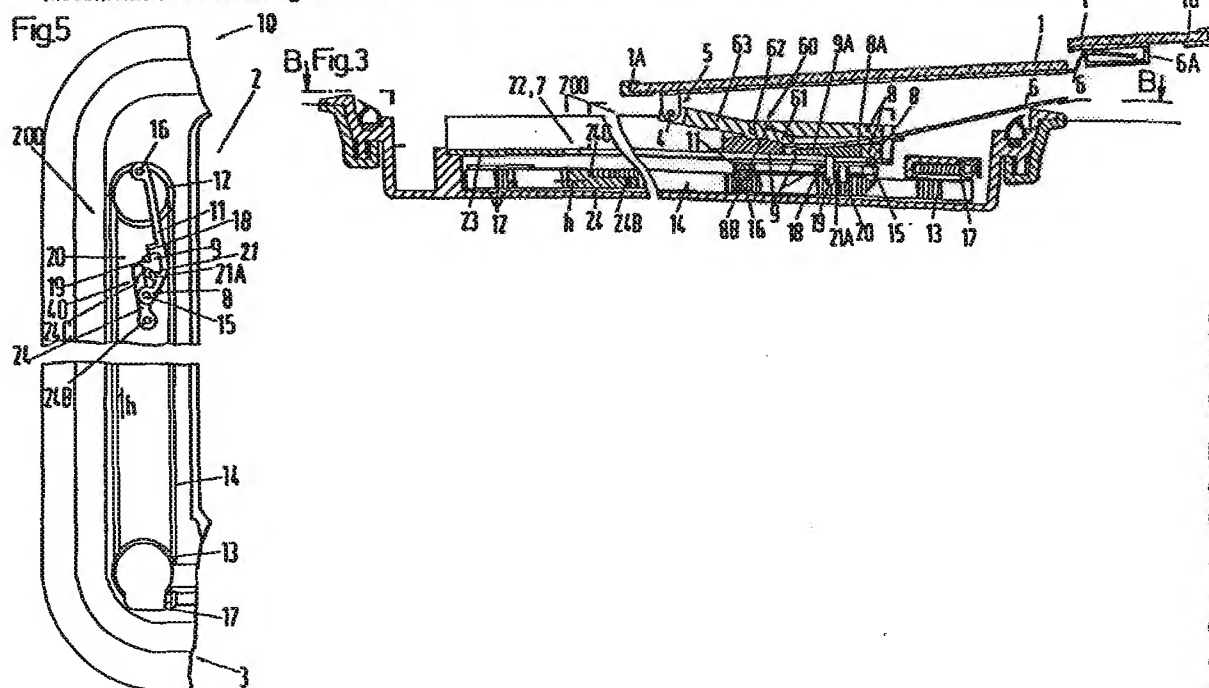
(58) Field of search

UK CL (Edition K) E2M

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(54) Actuating apparatus for a vehicle sunroof

(57) An actuating apparatus for opening and closing a displaceable roof part (1) of a sunroof for vehicles has a bracket (9) by means of which the roof part may traverse along a guide means (700) in its displacement direction and further comprises an actuating means 8, traversable along a guide means, for raising and lowering or tilting the roof part. There is provided an automatic coupling 20, Figure 5, for connecting or releasing the actuating member 8 to or from the bracket 9, with the coupling actuation preferably taking place when the roof part is raised, lowered or tilted out of the closed position, but is still or again within the projection of the roof opening (vertical movement position). Such an actuating apparatus is particularly suitable for those arrangements in which a raising or tilting function of the roof part on the one hand and a shifting function of the roof part on the other hand are carried out on opening or closing the sunroof one after the other by opposing movements of the actuating member.



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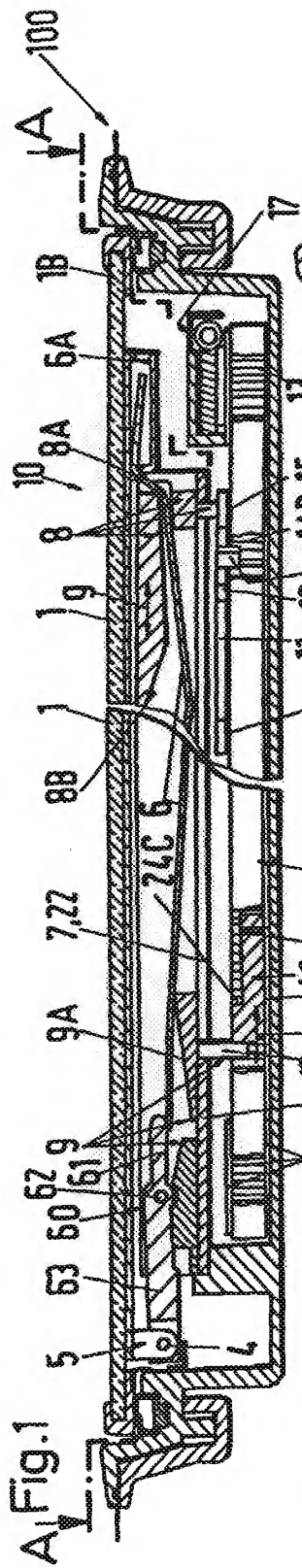


Fig. 1

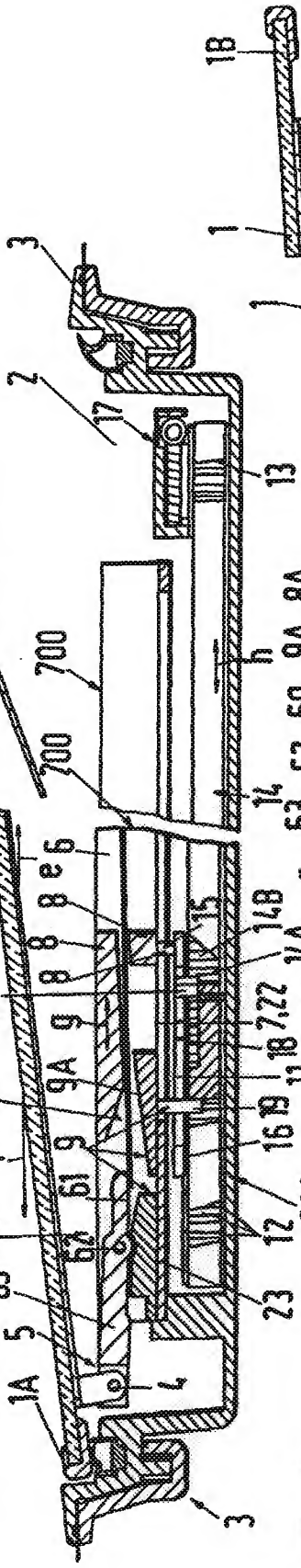


Fig. 2

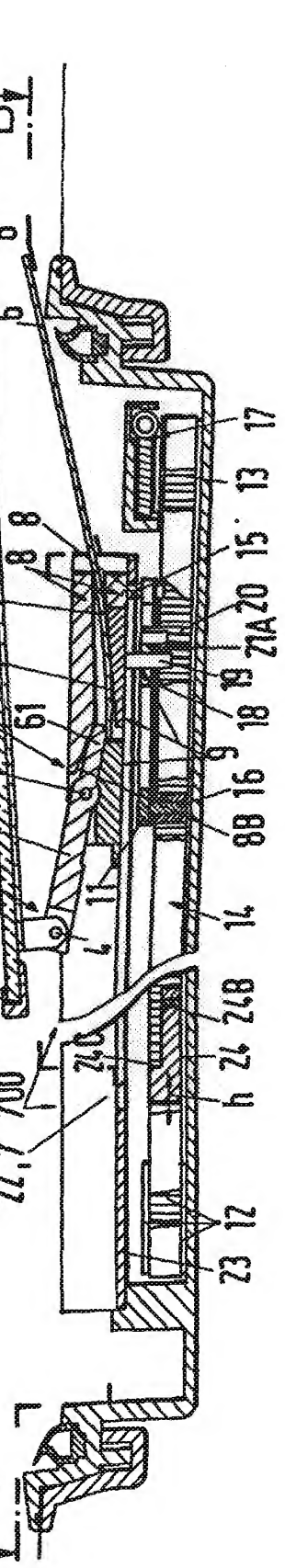


Fig. 3

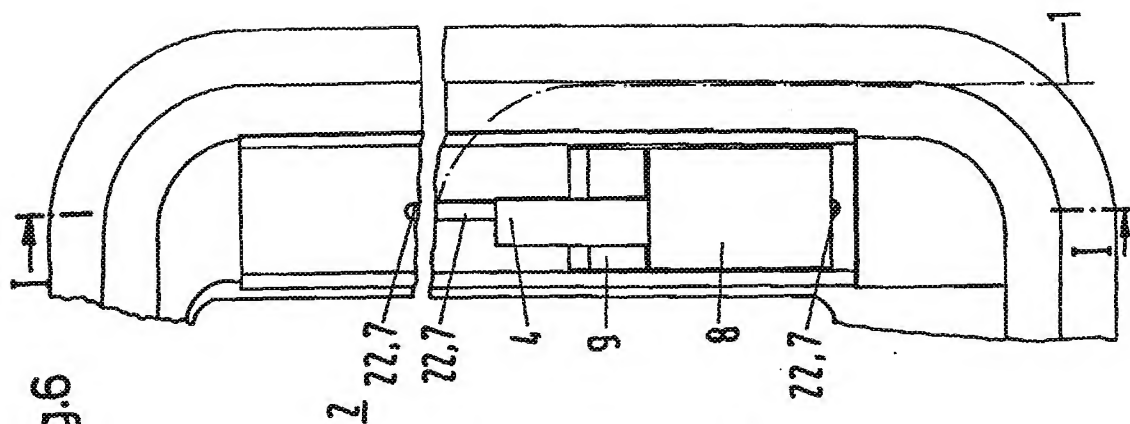


Fig. 6

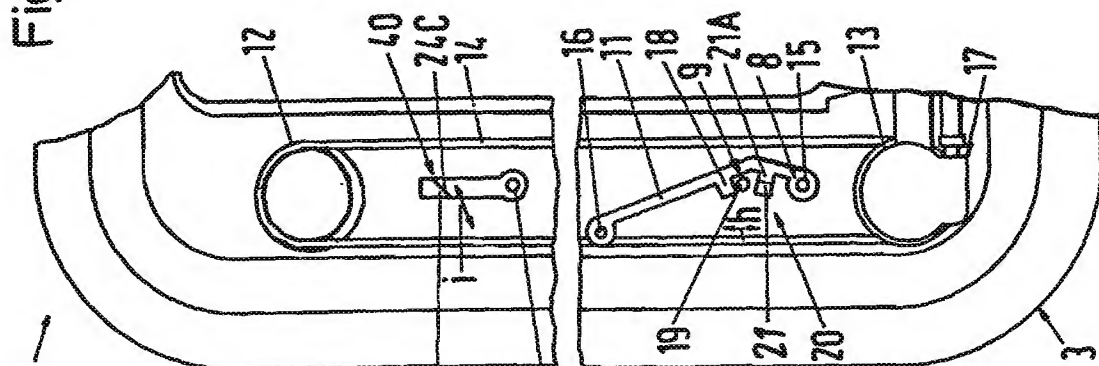


Fig. 5

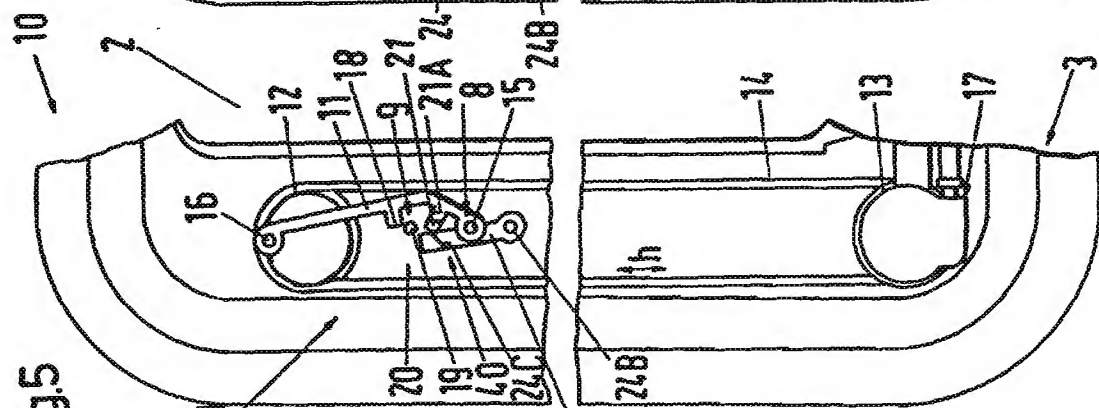


Fig. 4

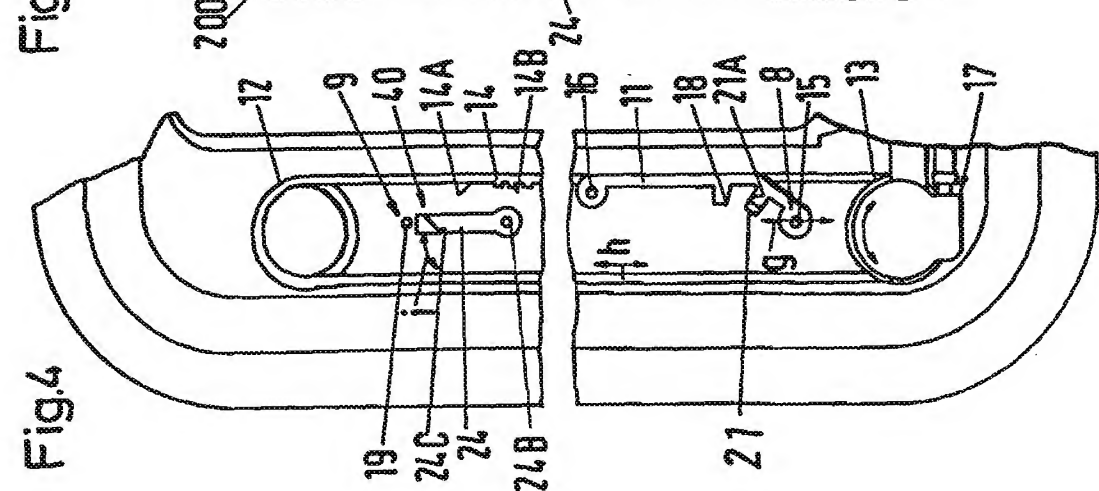
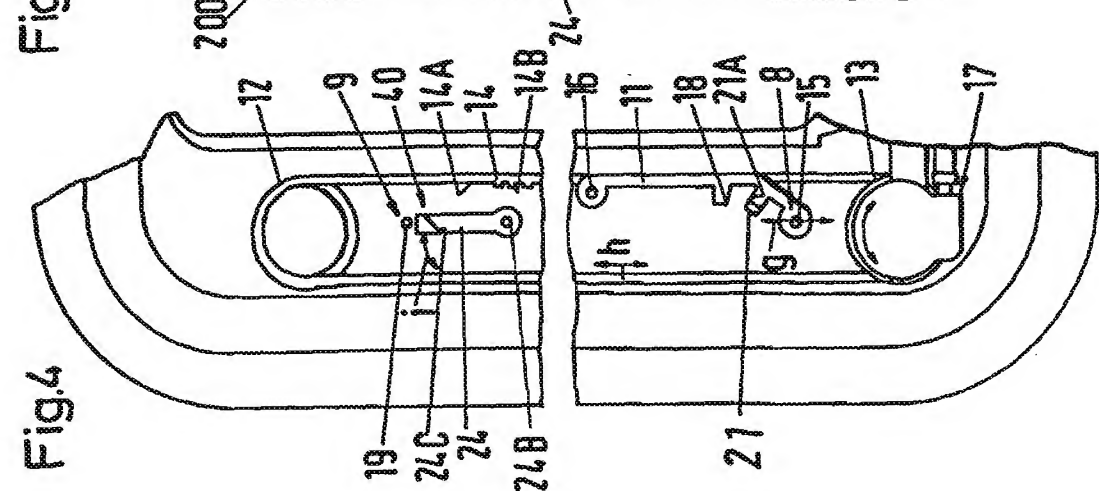


Fig. 4



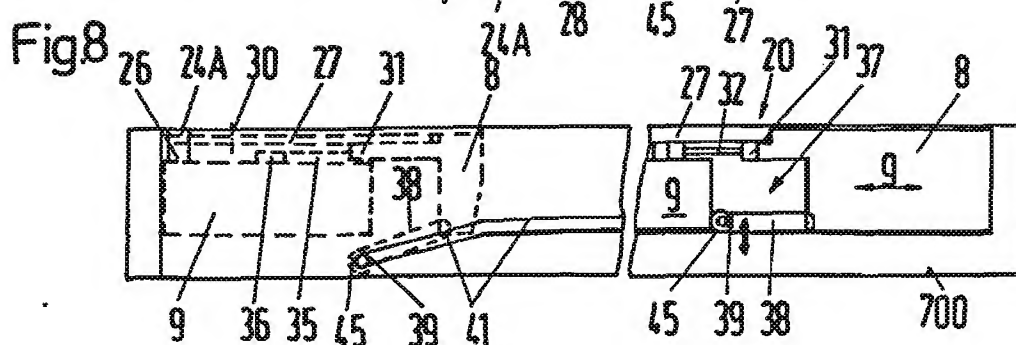
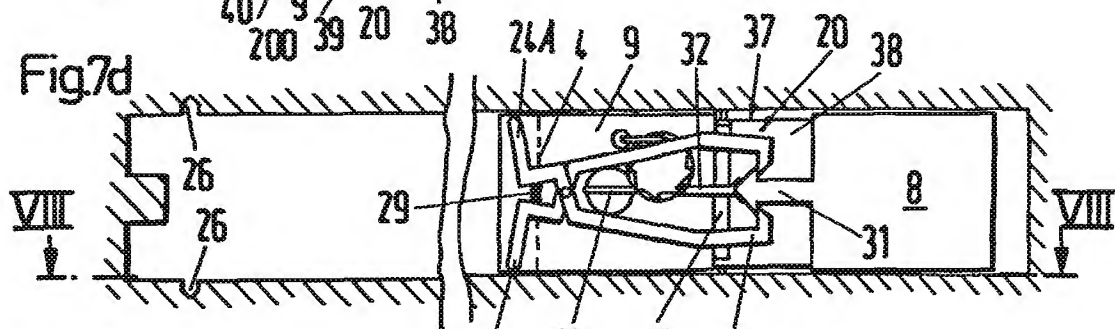
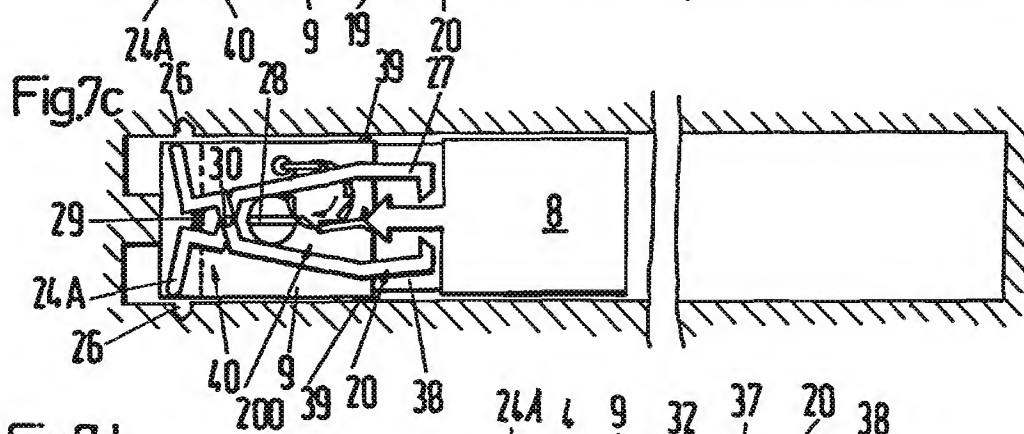
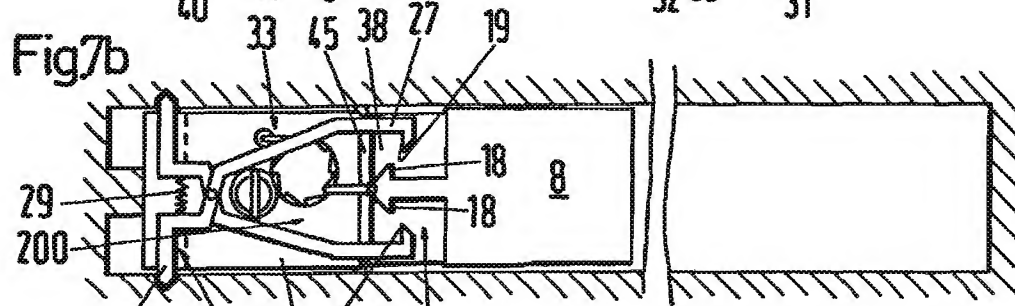
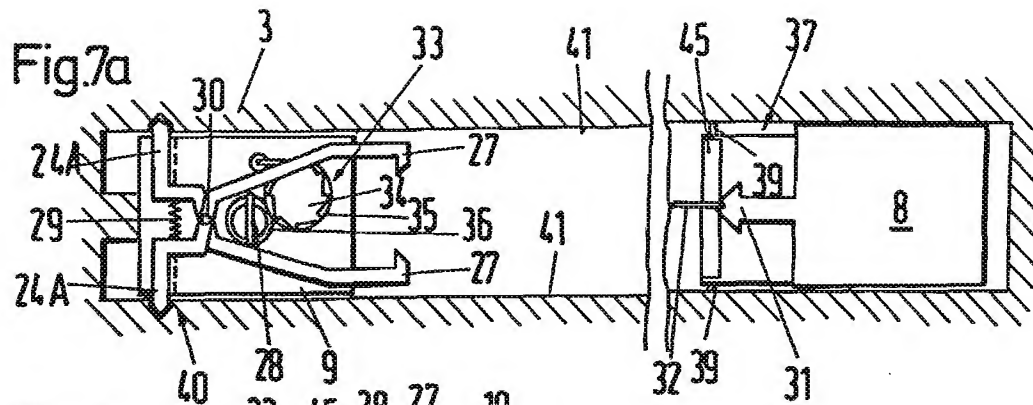


Fig.9a

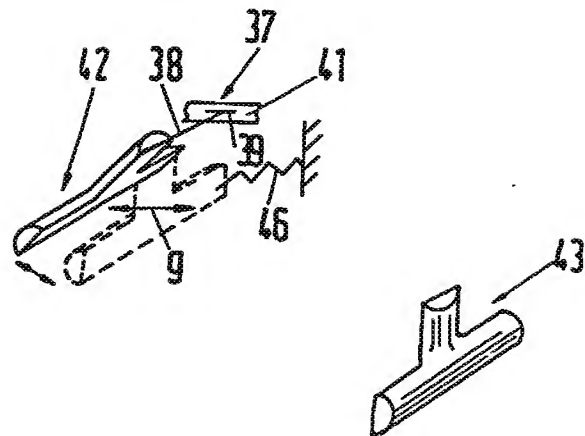
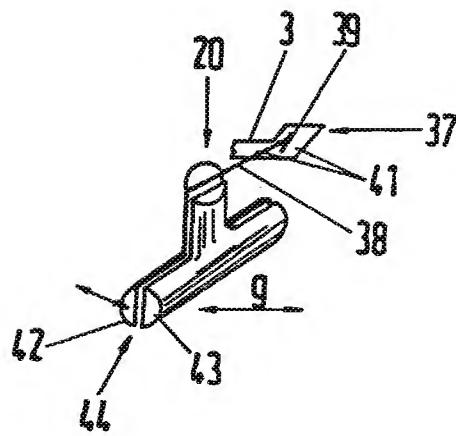


Fig.9b



Actuating apparatus for a vehicle sunroof

The invention relates to an actuating apparatus for opening and closing a displaceable roof part of a sunroof for vehicles of the kind having at least one bracket by means of which the roof part may traverse along a guide means in a displacement direction of the roof part, and having an actuating means, traversable along a guide means, for raising and lowering or tilting the roof part.

DE-C2-35 44 941 discloses an actuating apparatus for a vehicle sunroof in which, by means of a simple crank drive, three mutually independent movement procedures, namely the raising and lowering of the roof part both at the front and at the rear roof part edge as well as the shifting forward and back of the roof part, are possible, with the direction of actuation of the crank in the direction of opening and closing being the same for all three movement procedures. This actuating apparatus has the disadvantage that overall it is of complicated construction.

DE-U-88 14 568 discloses an actuating apparatus of the said kind in conjunction with the use of a pre-bent resilient flexion rod, in which the flexion rod acts on the roof part by means of its restoring force in the direction of opening and can, by means of a slide through which it passes and which is guided on a guide path, be elastically

deformed, as it approaches the guide path into its stressed straightened closed position, or as it is distanced from the guide path into its relaxed curved open position. In the case of this known vehicle sunroof, in which the use of the pre-bent resilient flexion rod is the chief point, it is supposed to be possible, in order to displace the cover of the sunroof, tilted out of its closed position, to displace both the bracket for the securing joint of the roof part as well as the actuating member for raising, lowering or tilting the roof part jointly in or in opposition to the direction of travel. Here, how such a common displaceability can be implemented remains completely open.

Taking this as a starting point, the object of the invention is to achieve a functionally reliable and simple operability for opening and closing the roof part (cover) in the case of actuating apparatus of the kind described, in particular those in which the raising or tilting function of the roof part on the one hand and the shifting function of the roof part on the other hand on opening and closing the sunroof can be carried out one after the other by opposing movements of the actuating member.

This invention provides actuating apparatus for opening and closing a displaceable roof part of a sunroof for vehicles, having at least one bracket by means of which the roof part may traverse along a guide means in a displacement direction of the roof part, and having an actuating

means, traversable along a guide means, for raising and lowering or tilting the roof part, characterized by an automatic coupling for connecting the actuating member to or releasing it from the bracket, having a self-actuating means for engaging or releasing the coupling in a first position of the bracket and of the actuating means in which the roof part is substantially in a position displaced from the closed position but is within the projection of a roof opening of the sunroof.

The actuating apparatus according to the invention may be used for a very great variety of types of drive for the actuating member, for example for actuating members which are displaceable purely by hand and which have an actuating handle, actuating members displaceable by means of a spindle drive, a toothed rack gear or the like, or actuating members displaceable by a deflectable cable or belt or the like.

As a result of the actuating apparatus according to the invention, opening and closing of the sunroof is possible for the person operating it without particular demands on concentration. The individual movement procedures take place in a functionally reliable manner one after the other. The actuating apparatus according to the invention may be used for a very great variety of raising, lowering or tilting mechanisms, and in contrast to the actuating apparatus known from DE 25 12 426 A1, the raising or tilting function on the one hand and the shifting function on the

other hand always take place by the same type of actuation, that is to say only by shifting movements or crank movements. In particular, the actuating apparatus according to the invention may be used in conjunction with the pre-bent, resilient flexion rods known from DE-U-88 14 568. It is possible both to arrange the actuating apparatus on a strut extending in the longitudinal direction of the vehicle approximately in the sunroof centre and also in the region of the side edges of the sunroof, extending in the longitudinal direction of the vehicle, e.g. in the region of the frame struts there. An actuating apparatus of this type is suitable in particular for those arrangements in which a raising or tilting function of the roof part on the one hand and a shifting function of the roof part on the other hand are carried out on opening or closing the sunroof one after the other by opposing movements of the actuating member.

Advantageous embodiments of the invention, which guarantee the functionally reliable uncoupling and coupling thereof and the possibility of simple production, are set out in claims 2 to 20.

The above-mentioned structural parts to be used in accordance with the invention are not subject to any special exceptional conditions as to their size, shape, material selection or technical design, so that the selection criteria known in the respective field of use can be used unrestrictedly.

Further details, features and advantages of the present sunroof mechanism will emerge from the description below with reference to the accompanying drawings, in which several embodiments of an actuating apparatus according to the invention are illustrated by way of example only, in the drawings:

Fig. 1 shows a vehicle sunroof in vertical section along the line I-I in Fig. 6 with the roof part closed;

Fig. 2 shows the same vehicle sunroof with the roof part slightly raised and pivoted;

Fig. 3 shows the same vehicle sunroof with the roof part shifted as far back as possible;

Fig. 4 shows, a plan view of the remote actuation and coupling mechanism of the vehicle sunroof according to Figs. 1-3, on the line A-A in Fig. 1, the position of the roof part corresponding to the position represented in Fig. 1;

Fig. 5 shows a view corresponding to Fig. 4, corresponding to the working position shown in Fig. 2;

Fig. 6 shows a view corresponding to Fig. 4 in a third working position, corresponding to the working position represented in Fig. 3, in two planes of view, namely on the left in plan view A-A and on the right in plan view B-B shown in Fig. 3;

Figs. 7a to d show a diagrammatic illustration of an alternative actuating apparatus, in four different working positions, viewed from above;

Fig. 8 shows the same actuating apparatus, in a side sectional illustration in vertical section along the line VIII-VIII in Fig. 7d, for two different working positions, namely the working position according to Fig. 7d in solid lines and the working position according to Fig. 7c in dashed lines, and

Figs. 9a/b show, a diagrammatic illustration of the actuating handles of a third embodiment of an actuating apparatus according to the invention, in two different working positions.

The vehicle, generally designated 100 in Figs. 1-6, has a sunroof 10 which in the illustrated embodiment is a raise-and-tilt roof in which, as the movable roof part 1, a light-permeable cover can be pivoted with respect to the frame 3 surrounding the roof opening 2 about an articulation axis 4, extending substantially horizontally and transversely to the longitudinal direction of the vehicle, of a securing hinge 5 in the region of the front roof part edge 1A upwards out of the roof opening 2, and is displaceable as a whole in the longitudinal direction of the vehicle (arrows f and e and double-headed arrow g). The cover 1 is thus raised and lowered at its rear edge 1B. By comparison with the extent of this raising and lowering, the cover is raised and lowered only to a comparatively small extent in the region of its front cover edge 1A.

Preferably, the pivoting procedure should only take

place if - as illustrated in Figs. 1 and 2 - the roof part 1 is within the projection of the roof opening 2, and is thus not yet or no longer displaced backwards out of this position. In order that the roof part 1 can be pivoted in this position (vertical movement position), a pre-bent resilient flexion rod 6, and an actuating means 8 which can traverse in the longitudinal direction of the vehicle along a slot-shaped guide element 7 fixed to the vehicle and serving as a component of a guide means 700, are provided and cooperate in the manner known from DE-U-88 14 568. This means that the actuating means 8 acts on the flexion rod 6 such that the flexion rod is offset, on displacement of the actuating means 8 along the guide element 7, from the pre-bent position into a more or less straight position, or vice versa. In the illustration according to Figs. 1 and 2, shifting the actuating means 8 to the right leads to transfer of the flexion rod 6 into an approximately straight position and thus to lowering of the roof part 1 into its closed position - illustrated in Fig. 1 - while displacing the actuating means 8 to the left moves the flexion rod 6 back into its pre-bent position, so that the roof part 1 opens further.

The roof part 1 is displaced bodily, in the pivoted-up state (Fig. 3), in that the securing hinge 5 is displaced in the longitudinal direction of the vehicle (double-headed arrow g) by means of a bracket 9 which may be pushed forward

and back in the longitudinal direction of the vehicle along the guide means 700.

Figs. 1 to 6 show a first embodiment of the actuating apparatus according to the invention, in which the actuating means 8 can be moved along the guide element 7 in the longitudinal direction of the vehicle by means of a tension- and compression-resistant connection member 11 and a drive belt 14 which circulates around two deflection rollers 12 and 13 and has on the inside 14A teeth 14B. For this purpose, the connection member 11 acts by means of a shaft 15 at one of its ends pivotally on the actuating means 8 in a tension- and compression-transmitting manner. The other end of the connection member 11 is pivotally connected to the drive belt 14 in a tension- and compression-resistant manner, by means of a connection peg 16. A rotary drive with a gear 17 moves the drive belt 14 in both directions of driving (double-headed arrow h). The working position, illustrated in Fig. 5, of the actuating means 8 corresponds approximately to the same working position as is illustrated in Fig. 2, that is to say the side of the drive belt 14 on the right in the drawing has already drawn the actuating means 8 out of the closed position (Figs. 1 and 4) into the upwardly pivoted open position of the roof part 1. During this initial movement phase of the actuating means 8, the bracket 9 carrying the securing hinge 5 is in the frontmost position illustrated in Figs. 1, 2, 4 and 5.

The actuating apparatus is equipped with an automatic coupling 20, which comprises a bar 18 and an abutment piece 19. The bar 18 is secured, spaced from the shaft 15, to the connection member 11 and in this manner to the actuating member 8, while the abutment piece 19 is rigidly connected to the bracket 9. As can be seen from Fig. 5, movement of the drive belt 14 clockwise or anti-clockwise in the vicinity of the (illustrated) dead centre position of the connection peg 16 leads to the actuating means 8 moving only slightly in the longitudinal direction of the vehicle. Since the connection peg 16 between the drive belt 14 and the connection member 11 is moved during this rotary movement from one side of the deflection roller 12 to the other, the bar 18 is shifted to behind the abutment piece 19 on this pivotal movement of the connection member 11. If the drive belt 14 is then actuated further anti-clockwise (Fig. 6), the left-hand side of the drive belt 14 shifts the actuating member 8 and, together therewith, the bracket 9 backwards, that is to say that the pivoted-up roof part 1 is moved backwards in the longitudinal direction of the vehicle. Regardless of the displacement position in which the bracket 9 finds itself outside its rest position, movement of the connection peg 16 in one or the other direction of rotation leads to a common traversing movement of the bracket 9 and the actuating means 8. If the connection peg 16 is moved clockwise, then (with the roof

part 1 already displaced backwards) the actuating means 8 is first moved slightly in the direction of the bracket 9 until a stop element 21A (similar to the bar 18) provided on the connection member 11 bears against the abutment piece 19 of the bracket 9, on the rear side of the abutment piece. The actuating means 8 then (on further rotation of the deflection roller 13 clockwise) shifts the bracket 9 ahead of it until the connection peg 16 has again approximately reached the dead centre position of the deflection roller 12, that is to say the bracket 9 is in the proper frontmost position. Further rotation of the deflection roller 13 clockwise then leads to the bar 18 being pivoted out of its locked position behind the abutment piece 19 until the connection peg 16 is again entirely in the region of the right-hand side of the drive belt 14, and the bar 18 is thus pivoted to such an extent that it can now pass the abutment piece 19 on further movement of the actuating member (downwards) without engaging in the abutment piece 19. Then, further movement of the actuating member 8 (downwards) leads to lowering of the roof part 1 until it is in its closed position.

The self-actuating means 200 of the coupling 20 thus essentially comprises the connection member 11, the deflecting rollers 12 and 13, the drive belt 14 and the bar 18.

In order to ensure that the bracket 9 also remains,

with absolute certainty, in its rest position during raising and lowering of the cover 1 and cannot be displaced for example because of forces acting on the roof part when the coupling 20 is open, a locking member 40 is preferably provided. In this embodiment, the connection member 11 has a finger-type peg 21 which, as it approaches the bracket 9, first comes to bear against a pawl 24 and, as it comes closer, and further out of its rest position, pivots this to the side in opposition to the force of a spring on a shaft 24B. This pawl 24 is arranged so that in its rest position (Fig. 4) it bears against the rear side of the abutment piece 19 of the bracket 9 and thus prevents displacement of the bracket. By laterally pivoting the pawl 24, by means of the finger-type peg 21 engaging a slide surface 24c, in the vicinity of the dead centre position (Fig. 5) of the connection peg 16, this locking of bracket 9 is released. After the abutment piece 19 has passed the now open pawl 24, the pawl 24 automatically reassumes its rest position. It remains there until the abutment piece 19 of the bracket 9 returns to the frontmost position and at the same time initiates the same forward and backward pivoting of the pawl 24, as explained above in connection with the action of the finger-type peg 21.

Both connection and disconnection of the coupling 20 and actuation of the locking member 40 are thus effected remotely solely by means of the drive member (in the drawing

by means of the drive belt 14), which is used to move the roof part 1. It will be appreciated that instead of the pawl 24, other components known per se may also be used as the locking member 40, such as restrictedly guided locking slides (bars).

The drive, coupling and locking mechanism illustrated in Figs. 4 and 5 as well as in the left-hand half of Fig. 6 is provided in each of the two side parts, extending on the left and right of the longitudinal axis of the vehicle, of the frame 3 of the sunroof 10 and is covered from above by a cover 23. The cover 23 has a longitudinal slot 22 (on the right in Fig. 6) through which the abutment piece 19 of the bracket 9 and the shaft 15 of the actuating means 8 extend. The longitudinal slot 22 at the same time serves as a guide element 7. Above the cover 23 are arranged the adjustment means for raising and lowering or pivoting and displacing the roof part 1. They substantially comprise the bracket 9, the actuating means 8, the flexion rod 6 and a raising apparatus 60 for the part of the roof part 1 located in the region of the front roof part edge 1B.

As can be seen from Figs. 1 to 3, the actuating means 8, guided by means of the guide means 700 in the longitudinal direction g of the vehicle, includes the pre-bent flexion rod 6, which is formed as a flat rod of spring steel and which is guided through a slot 8A of the actuating means 8 with adequate play. It will be

appreciated that the flexion rod 6 is not shown in its relaxed shape in any of the figures, because flexural forces act on the flexion rod 6 in all the positions illustrated of the roof part 1. The flexion rod 6 is suspended by one of its ends in a mounting 6A secured to the roof part 1. At its opposite end, it is clamped between a wedge-shaped surface 9A of the bracket 9 on the one hand and a pivotal holding-down piece 61 of the raising apparatus 60. The holding-down piece 61 forms one arm of the raising apparatus 60, constructed as a two-sided lever, and is secured around an axis 62 on the bracket 9 to be pivotal about an approximately horizontal axis 62 running transversely to the longitudinal direction g of the vehicle. The (second) lever arm 63 carries on its free end the securing hinge 5 of the roof part 1.

As can be seen in particular from Fig. 1, clamping of the flexion rod 6 between the highest point of the wedge-shaped surface 9A and the underside of the holding-down piece 61 when the roof part 1 is closed leads to a force pressing the front roof part edge 1A downwards against the frame 3 and the seal provided there. This force is decreased insofar that the flexion rod 6 can bend back resiliently as a result of the actuating means 8 being shifted forward (see Fig. 2). If the actuating means 8 has arrived at its front dead centre position in which coupling to the bracket 9 also occurs, a wedge-shaped surface 8B of

the actuating means 8 presses from above onto the free end of the holding-down piece 61, which is thereby pressed down and consequently raises the roof part 1, in the region of its front roof part edge 1A, sufficiently far away from the frame 3 and the associated seal to prevent excessive friction in the seal region when the roof part 1 is subsequently displaced backwards (Fig. 3).

It will be appreciated that the raising apparatus 60 for sunroofs, having actuating apparatus of the kind initially referred to for opening and closing the displaceable roof part using a flexion rod, may also be used to advantage if the automatic coupling according to the invention is dispensed with.

While the embodiment according to Figs. 1 to 6 is provided for drive arrangements using a circulating drive belt or the like, the alternative embodiment according to Figs. 7a to 8 is particularly suitable for a purely linear drive such as a spindle drive, a handle or the like.

Fig. 7a shows the bracket 9 in its rest position, locked with respect to the roof frame 3, in which position tongs-like coupling elements 27 are held, by means of a rotary bar 28, forcibly in their open position in opposition to the urging of a spring 29. Then, locking bars 24A are in a forcibly locked position, since they are forcibly connected in the manner of tongs by way of a joint peg 30 to the coupling elements 27, and are forcibly moved with the

latter.

The actuating means 8 has a coupling element 31 corresponding to the coupling elements 27, and furthermore carries an actuating pin 32 which, with every working stroke, rotates a conventional ratchet arrangement 33 by a defined angle of rotation. The corresponding movement of the actuating pin and the ratchet arrangement are shown in Figs. 7b and 7c. The ratchet wheel 34 has a toothed ring 35 which meshes with a toothed ring 36 carrying the rotary bar 28. The toothed rings 35 and 36 are matched to one another so that each working stroke of the actuating pin 32 leads to a rotation of the rotary bar 28 by 90° , produced in the embodiment illustrated by a diameter ratio of 2:1 between the toothed rings 35 and 36 (with the same tooth pitch).

As can be seen from Figs. 7a to 7d, bringing the actuating member 8 closer to the bracket 9 leads to automatic coupling between the coupling elements 27 and 31 and to unlocking of the locking member 40, between the bracket 9 and the frame 3. In order, in the case of a common shift backwards of the actuating member 8 and of the bracket 9 from the position illustrated in Fig. 7d to that illustrated in Fig. 7c, to prevent the ratchet arrangement 33 from being actuated as early as the moment when this shifting movement begins, there is provided a locking element 27, as can be seen in particular from Fig. 8, which comprises a locking arm 38, pivotally secured to the

actuating member 8 and having laterally arranged slide blocks 39 which engage in guides 41 fixed to the frame. The guides 41, in the shape of grooves, extend along the majority of the displacement part of the actuating member 8 parallel to the guide element 7 thereof. The length of the locking arm 38 is chosen such that it spans the working path required for actuating the ratchet arrangement 33 and bears more or less exactly against the bracket 9 in all working positions in which the actuating member and the bracket coupled thereto traverse together, by means of a roller body 45 at its free end. The locking arm 38 thus transmits the shift force, directed towards the left in Figs. 7a to 8, of the actuating member 8 to the bracket 9 and prevents actuation of the ratchet arrangement 33 in the working positions concerned. The guides 41 are downwardly inclined in their end region, illustrated on the left in the drawing, so that when the actuating member 8 traverses to the left the locking arm 38 comes out of engagement with the bracket in the position of the bracket 9 in which the roof part has reached its frontmost shifted position. Further traversing of the actuating member 8 to the left, now with the bracket 9 at rest, leads to actuation of the ratchet arrangement 33 so as to release the coupling 20 and lock the locking member 40, that is to say the reverse procedure to that illustrated in Figs. 7b and 7c is carried out.

In this embodiment, the automatic actuating means 200

of the coupling 20 essentially comprises the actuating pin 32, the ratchet arrangement 33 and the locking bar 28.

While the embodiment according to Figs. 7a to 8 is suitable both for a spindle drive, a toothed rack drive or the like and for a manually operable slide for adjusting the actuating member 8, there is represented in Figs. 9a/b an example of a slide arrangement operable purely by hand. The two-armed hand grip 42 is connected to the actuating member 8 (not illustrated in the drawing) so that the latter is displaceable by hand, and is so shaped that it can also be actuated jointly with a correspondingly shaped second hand grip 43, as can be seen from Fig. 9b. The second grip 43 is connected to the bracket 9 so that the grip 43 can displace the bracket 9 together with the roof part. Thus, with this arrangement of the grips 42 and 43, it is possible to use the two hand grips either separately from one another or indeed jointly. In the simplest case, a coupling between the actuating member 8 and the bracket 9 or the grips 42 and 43 is brought about in that both grips (for example as illustrated in Fig. 9b) form a jointly operable grip 44.

For this, the grips 42 and 43 are so shaped and arranged that they can be actuated both separately from one another or jointly as a hand grip 44 by one hand of the operator.

In order to simplify changing from sole actuation of the grip 42 to joint actuation of the grips 42 and 43 - or

vice versa - the grip 42 as illustrated in Fig. 9a can be moved out of the position (illustrated in dashed lines in Fig. 9a) corresponding to the respectively other grip, e.g. corresponding to that illustrated in Fig. 9b, and in particular can be pivoted out (illustrated in solid lines in Fig. 9a). This pivoting out preferably takes place as a result of the force of a spring 46 and brings about releasing of the coupling 20, of whatever type. In order that the coupling 20 should be opened or closed only in the desired position of the grips 42 and 43, i.e. the grip 42 is pivotable, a corresponding locking element 37 (according to Claim 14) is provided. For this there serves, similarly to the case of the embodiment according to Figs. 7a to 8, a pivot arm 38 connected to the grip 42 and having a slide block 39 guided in a guide 41 on the frame 3.

Claims:

1. Actuating apparatus for opening and closing a displaceable roof part of a sunroof for vehicles, having at least one bracket by means of which the roof part may traverse along a guide means in a displacement direction of the roof part, and having an actuating means, traversable along a guide means, for raising and lowering or tilting the roof part, characterized by an automatic coupling for connecting the actuating member to or releasing it from the bracket, having a self-actuating means for engaging or releasing the coupling in a first position of the bracket and of the actuating means in which the roof part is substantially in a position displaced from the closed position but is within the projection of a roof opening of the sunroof.
2. Actuating apparatus according to Claim 1, characterized by a locking member preventing displacement of the roof part when the coupling is open.
3. Actuating apparatus according to Claim 1 or 2, characterized in that the actuating means can traverse by means of a deflectable tension/compression element such as a cable or a deflectable drive belt, preferably in the form of a toothed belt, or the like.
4. Actuating apparatus according to Claim 3, characterized

by a pivotal connection member connecting the tension/compression element to the actuating means in the manner of tension and compression.

5. Actuating apparatus according to Claim 3 or 4, characterized by a deflection means for the tension/compression element, making possible a dead centre position of the actuating means.

6. Actuating apparatus according to any one of Claims 3 to 5, characterized in that the coupling has a pivotal bar and an abutment piece provided on the bracket, and the bar engages releasably behind the abutment piece by means of its pivotal capacity.

7. Actuating apparatus according to Claim 2, characterized by a locking element which may be laid transversely to the direction of traversing of the actuating means and which cooperates with the sunroof and the bracket so as to releasably block the roof part against displacement, and which is movable by means of a stop element of the actuating means in the opening and closing directions.

8. Actuating apparatus according to Claim 7, characterized in that the locking element is in the form of a pawl pivotable against a spring force.

9. Actuating apparatus according to Claim 8, characterized in that the pawl is pivotable by a lateral sliding against the stop element.

10. Actuating apparatus according to Claim 1, characterized

in that the coupling is adjustable by means of activating and deactivating elements active in the direction (g) of traversing of the actuating means.

11. Actuating apparatus according to Claim 10, characterized by a ratchet arrangement.

12. Actuating apparatus according to Claim 10 or 11, characterized by a locking member holding at least one coupling element in its open position in opposition to the force of a spring.

13. Actuating apparatus according to any one of Claims 10 to 12, characterized in that a locking member is forcibly moved, for fixing the bracket in its vertical movement position, with the movement of the coupling elements.

14. Actuating apparatus according to any one of Claims 10 to 13, characterized by a locking element preventing actuation of the coupling in a position of the roof part other than that in which the roof part is raised, lowered or tilted out of the closed position but is still or again within the projection of the roof opening (vertical movement position).

15. Actuating apparatus according to Claim 14, characterized in that the locking element keeps the actuating member and the bracket spaced in the coupled-together state.

16. Actuating apparatus according to Claim 15, characterized in that the locking element is forcibly

actuatable by means of guide elements active along the traversing path of the actuating member.

17. Actuating apparatus according to any one of Claims 1 to 16, characterized by a pre-bent resilient flexion rod which acts on the roof part by its restoring force in the opening direction and which can be moved by means of the actuating member into its stressed, more or less straight closed position and into its relaxed, bent, open position.

18. Actuating apparatus according to any one of Claims 1 to 17, characterized in that guide means are/is arranged on a strut interrupting the roof opening or on one or both of the lateral roof opening edges.

19. Actuating apparatus according to Claim 1, characterized by mutually corresponding, individually and jointly actuatable grips for individual and joint traversing of the actuating means and the bracket.

20. Actuating apparatus according to Claim 19, characterized in that at least one of the grips may be moved in the separately usable working positions out of the position for joint actuation of the grips.

21. Actuating apparatus for a vehicle sunroof, substantially as herein described with reference to Figs. 1 to 6, Figs. 7a to 8, or Fig. 9 of the accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

Application number
 9125383.1

Relevant Technical fields

(i) UK Cl (Edition ^K) ^{E2M}

(ii) Int Cl (Edition ⁵) ^{B60J}

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

A H MITCHELL

Date of Search

10 FEBRUARY 1992

Documents considered relevant following a search in respect of claims 1-21

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2231006 A (ROCKWELL) Note the coupling device 28, Figure 2	1
X	GB 2133460 A (ROCKWELL) Note the detent 54, Figure 7	1
X	EP 0182431 A2 (VALLKO) Note automatic locking means 40	1

Category	Identity of document and relevant passages	Relevant to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

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Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).

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US20020070586	4	4	0	1
US004312534	4	4	0	1
US004749225	9	9	0	1
US006893083	10	10	0	1
GB002250779A	29	29	0	1
Total (5)	56	56	0	-